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Influencing Factors Analysis IoT Adoption in Indonesian State Housing Management Information System

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Abstract

The Internet of Things (IoT) has revolutionized asset management in Smart Homes. In Indonesia, one of the biggest struggles in implementing emerging technology in the e-government system is connecting the users' behavioral intention with the suitability of the type of work and the technological convenience offered. A technology acceptance and use model is proposed to address this issue by analyzing the correlation between IoT adoption in asset management. The model draws insights from two complementary methods: user behavioral intention predicts utilization, and task-technology fit predicts performance with moderating factors analysis. The study finds that social influence, hedonic motivation, and price value factors are compelling users' intentions to adopt the Internet of Things in asset management. The IoT technology is deemed worth the price for asset management, particularly for state residences, due to its automation, accuracy, and real-time features. It also enhances decision-making, as the asset information is more reliable and secure. This study enriches moderating factors analysis to study the effect of technology adoption. Additionally, research on asset management systems still needs to be improved, especially in the government sector. In conclusion, this study provides insights into adopting IoT in the government sector and its potential to transform asset management.

Keywords: Technology Adoption, Internet of Things, Asset Management, E-Government, Smart Asset.

1. Introduction

Digitalization is crucial to an organization's business processes in the age of the fourth industrial revolution. Government and corporate organizations employ digitalization, which entails process-based exploitation of new technology for competitive advantage [1], [2]. The goal of digitalization is to create an ecosystem with interconnected living things. The four primary components of digitalization are big data analytics, cloud computing, the internet of things, and mobile internet [3].

There is abundant research on integrating those four digitalization components into corporate asset management systems, mainly concerning the Internet of Things (IoT). Individuals and businesses have investigated IoT for various purposes. Some of those purpose including remote sensing, energy conservation, decision-making processes, logistic tracking, smart building, and predictive maintenance [4], [5], [6], [7], [8], [9].

The commercial and technological adoption of IoT devices is expanding quickly. IoT is also followed by integration with the information system of house management known as smart home. Smart homes are being built into many recently constructed commercial housing estates, which make energy savings and device monitoring possible [10]. With the rise in smart homes and IoT installations in residential settings, the sustainable development goals (SDGs) are envisaged to be more frequently met [11].

The State Asset Management Information System (SIMAN), designed by the Directorate General of State Asset Management under the Ministry of Finance, is an enterprise asset management system used by the Indonesian government. All ministries and government agencies in Indonesia manage state-owned assets using SIMAN. SIMAN has recently been transformed into a website system, allowing SIMAN to be always online and facilitating IoT implementation. Due to its ability to complete the acquisition, operation, maintenance, and disposal/replacement stages of the asset lifecycle, SIMAN is considered an enterprise asset management system [12].

From the beginning of the creation of the system up until now, SIMAN still relies on input from Ministry of Finance employees all around Indonesia, raising questions about data integrity. IoT, a cutting-edge emerging technology, could help solve this issue by minimizing the effect on humans, which can reduce human error [13]. It enables remote control over integrated devices and monitoring over power consumption [14], [15]. Moreover, it improves the enterprise asset management system by adding a Geographic Information System (GIS) to support remote sensing and give spatial data analytic capabilities [16], [17].

The information and communication technology strategy of Directorate General of State Asset

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Management has mentioned that institutions need to implement the IoT as essential element towards Industry 4.0 [18]. But up until now, it is incomplete. Support from leaders must be gained toward successful implementation of IoT.

Analyzing factors that influence utilization is a vital success factor in realizing the deployment of IoT in many case studies such as smart government, smart city, and smart campus [19], [20], [21]. Therefore, preliminary research on user interest and implementation benefits is required to enable organizations to feel confident deploying IoT. There is an opportunity to continue studying state asset case studies and asset management information systems, as there has been broad previous research on technology adoption, including IoT technology, smart homes, and e-government. Additionally, numerous studies have demonstrated that user interest and implementation advantages are often examined concerning a particular technology adoption. Therefore, this study is essential for the organization to analyze the factors that influence the implementation of IoT in the state asset management information system.

The adoption of new technologies was hindered by users' experience-driven resistance, which stemmed from fears about unproven automation, cumbersome processes, and increased workload. Some aspects should be analyzed to impact user intention of adopting emerging technologies [22], [23]. Several recent studies show the importance of comprehending how people behave, how organization strategize, and how technology accommodate when embracing emerging technology and they reinforce the UTAUT and/or task-technology fit frameworks within asset management projects [24].

Recent studies show the importance of comprehending people's behavior when embracing new digital technology. These studies reinforce the extended technology acceptance model (TAM2) and technology organization environment (TOE) frameworks within construction projects and e-commerce [2], [25]. It led to a complex relationship between system features and responsible system usage. Other studies have shown the UTAUT2 and TTF models' effectiveness in analyzing user intentions towards augmented reality implementation in learning and e-commerce study cases [26], [27]. However, no one uses it to comprehend the factors influencing users' behavior in asset management systems.

To address those gaps, this study developed the following research question to direct the development of this study considering the gaps in several previous research studies and real-world applications in the government sector:

“What compels users’ intention to adopt the Internet of Things for state-owned asset management?”

Consequently, the author drives this study by analyzing the technology and user acceptance to reduce the irrelevance of implementing emerging digital technology compared to the system's user-oriented requirements.

This study instead attempts to examine it using the Unified Theory of Acceptance and Use of Technology (UTAUT2) rather than the TAM consequently. Venkatesh created the UTAUT model in 2003, which was later enhanced into UTAUT2 in 2012, to study how consumers accept innovations [28], [29]. This study also uses the UTAUT2, and technology-task fit (TTF) models to determine the degree of fit between the capabilities and characteristics of the technology and the tasks users must do [30].

1.1. Enterprise Asset Management System

Based on ISO 55000:2014 about asset management overview, principles, and terminology, influencing factors for asset type that an organization needs to fulfill its goal [12]. Also, organization needs to know how to manage the assets are organization objective and character, context of operation, regulatory essentials and financial limitations, and organization needs and stakeholder expectations. Organizations must consider these factors when installing, executing, sustaining, and continuously enhancing asset management.

Organizations must effectively manage risks and opportunities to realize value from their assets to strike the ideal balance between cost, risk, and performance. The legal and regulatory framework in which businesses operate presents more and more difficulties. Moreover, the fundamental risks that many assets carry change over time.

An organization can achieve its goals by using assets to their full potential through asset management. Value will vary depending on these goals, the organization's nature and purpose, and the demands and expectations of its stakeholders. Asset management helps to realize value while managing risks, expenses associated with financial, environmental, and social costs, service quality, and asset performance. The advantages of asset management are enhanced financial performance, competent asset investment decisions, risk management, enhanced services, and outputs, proven social responsibility, established compliance, increased reputation, increased organizational resilience, and improved processes, procedures, and asset performance.

The organization manages, controls, and coordinates its assets using an asset management system. It can offer better risk management and confidence that the organization will consistently attain asset management goals. However, an asset management system cannot codify all asset management activities. For instance, the business may use arrangements outside the asset management system to control characteristics like leadership, culture, motivation, and behavior, which can substantially impact the attainment of asset management objectives.

1.2. Internet of Things

The adoption of the Internet of Things (IoT) is one of the key technological paths for the rise of the digital economy [31]. Dynamic growth and the acceptance of digital technologies in all facets of human existence have established a favorable foundation for the transition to the digital economy. IoT technology must be used in businesses all over the world. Hence, the topic of how to practically realize IoT principles has become extremely important. The lack of clear ways for connecting IoT sensors to cloud platforms for data gathering and analysis is one of the current issues, in particular.

As soon as numerical programmable tools became widely available, the development of technologies and protocols enabling management and control of the industrial equipment control software utility within an enterprise network became necessary. At that time, management of such control utility over Internet was out of question. In parallel, several concerns arose due to the design and development of proprietary technologies and protocols; in most cases, they are incompatible with each other. Since such technologies and protocols were the intellectual property (IP) of the relevant enterprise, no legal framework describing structure and operation principles of such technologies and protocols existed. As the IoT concept started to appear, activities aimed at standardizing and documenting the previously developed technologies and protocols began. As a result of the analysis of existing protocol elements, a document having a general list or register of protocols was developed. Notwithstanding, the compiled document contained just descriptions of the existing set of technologies and protocols, without the information about their ability to interact with each other, or about the methods of connecting to cloud-based platforms. Each manufacturer built the systems based on those protocols that the manufacturer considered to be the most suitable for solving specific tasks. Numerous manufacturers' equipment uses specific protocols that were specially developed by the manufacturers for the management and data delivery tasks for different industrial solutions.

In the building management industry, the development and application of the Internet of Things (IoT) has had a notable upsurge over the last five years (2019–2024). There are variables driving this tendency, such as:

a. Reduced cost. As a result of developments in sensor and communication technologies, IoT solutions for buildings are now more reasonably priced [5], [7], [13].

b. Data-driven decisions. By producing real-time data on occupancy, energy consumption, and equipment performance, IoT makes it possible to make data-driven decisions that maximize building operations [9], [32], [33].

c. Enhanced efficiency. Energy efficiency, occupant comfort, and maintenance costs can all be decreased by automated systems that leverage Internet of Things data [5], [8], [34].

As discussed above, the Internet of Things (IoT) research has become a massive study in asset management systems. IoT has served various purposes for asset management systems, one for remote sensing [4]. This study combined IoT and big data analytics methods (machine learning, deep learning, and artificial intelligence) and showed readers a systematic and comprehensive review of recent big data analytics. Next, IoT can be used to create an early warning and smart power consumption system [5]. IoT and big data were also integrated into this project to create a system for monitoring daily power consumption. Another study revealed that the IoT can enhance decision-making processes with sufficient data quality and integrity to help asset management [6].

According to the study's findings, IoT adoption enables more precise and thorough predictive analysis, boosting asset management process confidence and enhancing risk-based decision-making predictability. Moreover, effective public service delivery would arise from the combination of IoT with e-government [33]. According to the study, there are motivations for integrating IoT into e-government, including maintaining the economy, effectiveness, and efficiency of government functions, all of which would contribute to the development of a citizen-government connection. Specifically in asset management, IoT would produce a more effective and efficient asset management process [9]. The resource management system based on genetic algorithms (GA) and incorporating machine learning for predictive maintenance in fog computing is presented in this paper. The utilization of IoT-based smart devices, such as RFID tags, QR codes, LoRa tags, etc., for asset tracking and identification has increased due to the creation and popularization of ubiquitous computing.

1.3. Implementation Scenario

In terms of IoT adoption within state-owned assets management, we define several implementation scenarios by outlining how to use internet-connected devices to gather data and improve how to manage state-owned assets. There have been several commercial implementations of IoT adoption towards assets management, such as smart home (Bardi, Xiaomi Home, etc.), smart car (Bluebird, Online Taxi), and smart inventory (supply chain, Amazon, etc.). Therefore, state-owned assets have a great opportunity to be implemented with IoT, here are some scenarios that can be developed:

a. Smart Home. Energy and water usage in state residences or apartments can be tracked to save even more money by integrating IoT. Special sensors or devices can be installed on electric meters and PDAMs to regularly communicate data to SIMAN via the internet. Every piece of building lighting or electronic equipment in the home can have sensors installed on it, or it can use IoT-enabled devices so that in the event of damage, it can also report the issue to SIMAN for repair. IoT devices can be linked to building or residential CCTV systems for ongoing security surveillance. A unit may also be shut out of the system if it is not locked in an empty condition. In addition, building roof temperatures can be monitored via IoT usage, allowing for calculating potential savings if solar panels are installed.

b. Smart Car. Cars and other official vehicles can benefit from preventive maintenance by using IoT, which will improve the vehicles' longevity and increase their resale value. Cars can be equipped with specialized sensors or gadgets to monitor the state of the tires, engine, or the automobile overall. IoT allows for the creation of an early warning system for vehicles that are judged to require maintenance. The integration of IoT technology in government vehicles can also track fuel use, allowing for the evaluation of whether vehicles are deemed wasteful or have less economical use. Dashcams or other specialized devices can be installed and used as supporting evidence in the event of an accident or traffic infraction.

c. Smart Inventory. Using IoT for office supplies, inventories, and equipment improves the accuracy and real-time tracking of the whereabouts and availability of commodities. To automatically track an item's position and availability using SIMAN, a QR code can be embedded in it, and each room can have a QR reader (an alternative that uses RFID and sensors). We can develop an early warning maintenance system for office equipment that can facilitate the introduction of the Internet of Things. IoT will help to ensure better maintenance, longer lifespans, and higher selling prices for these things. By distributing procurement miscommunications from head office units to regional work units through IoT, it is also possible to track goods until they arrive at their destination. In addition, it can be used on items transported to a warehouse and scanned, in which case the items are automatically classified as damaged.

1.4. Task-Technology Fit

Within IS research, the relationship between personal performance and information technology has long been of interest. Utilizing findings from two complementary research streams—task-technology fit as a performance predictor and user attitudes as usage predictors—this article presents and examines a new, comprehensive model of this relationship. The central claim of this new concept, known as the Technology-to-Performance Chain (TPC), is that information technology needs to be used and well-suited to the tasks it supports to positively affect individual performance [30]. This new paradigm is in line with the one put forth by research in that it holds that individual performance is impacted by both technology utilization and user attitudes toward it [35]. It differs in two significant ways from that research approach. Firstly, it emphasizes how crucial task-technology fit (TTF) is to understand how technology affects performance. Task-technology fit is a crucial concept that many earlier models either lacked or simply hinted at. Second, it provides a stronger theoretical foundation for considering a few issues related to the impact of IT on performance since it is more explicit about the connections between the constructs. These include selecting proxies for MIS success, comprehending how user interaction affects performance, and creating more accurate diagnostics for IS issues [26]. Research model shown in Figure 1.

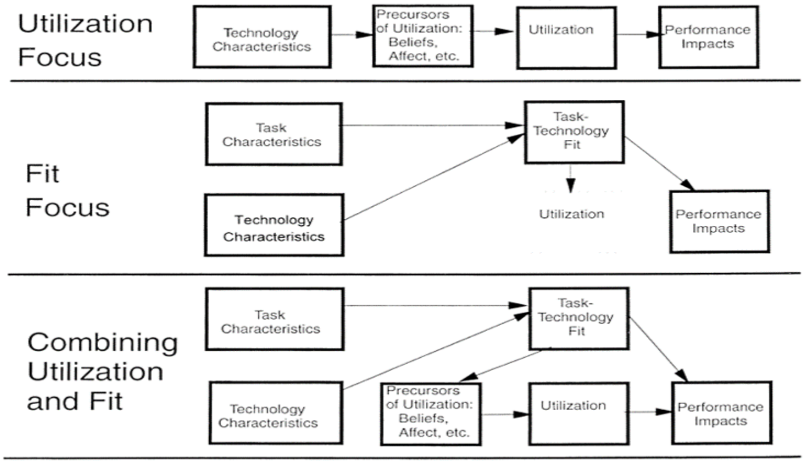

Figure 1. 3 Research Model of Technology-Performance Chain [30]

1.5. Unified Theory of Acceptance and Use of Technology

A unified model, called the Unified Theory of Acceptance and Use of Technology (UTAUT), was formulated, with four core determinants of intention and usage, and up to four moderators of key relationships [28]. UTAUT thus provides a useful tool for managers needing to assess the likelihood of success for new technology introductions and helps them understand the drivers of acceptance to proactively design interventions (including training, marketing, etc.) targeted at populations of users that may be less inclined to adopt and use new systems. The UTAUT research model is shown in Figure 2.

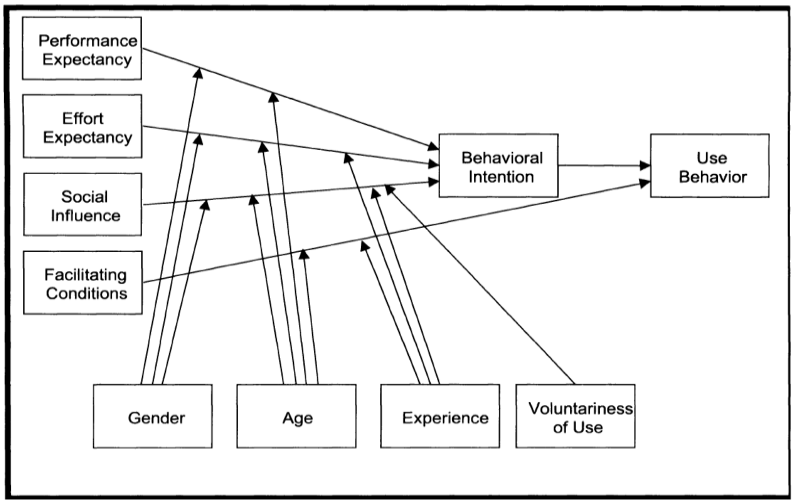

Figure 2. Research Model of UTAUT [28]

An extended the UTAUT developed to study acceptance and use of technology in a consumer context. The proposed UTAUT2 incorporates three constructs into UTAUT: hedonic motivation, price value, and habit [29]. Individual differences—namely, age, gender, and experience—are hypothesized to moderate the effects of these con-structs on behavioral intention. The lighter lines in Figure 3 show the original UTAUT along with the one modification noted above that was necessary to make the theory applicable to this context.

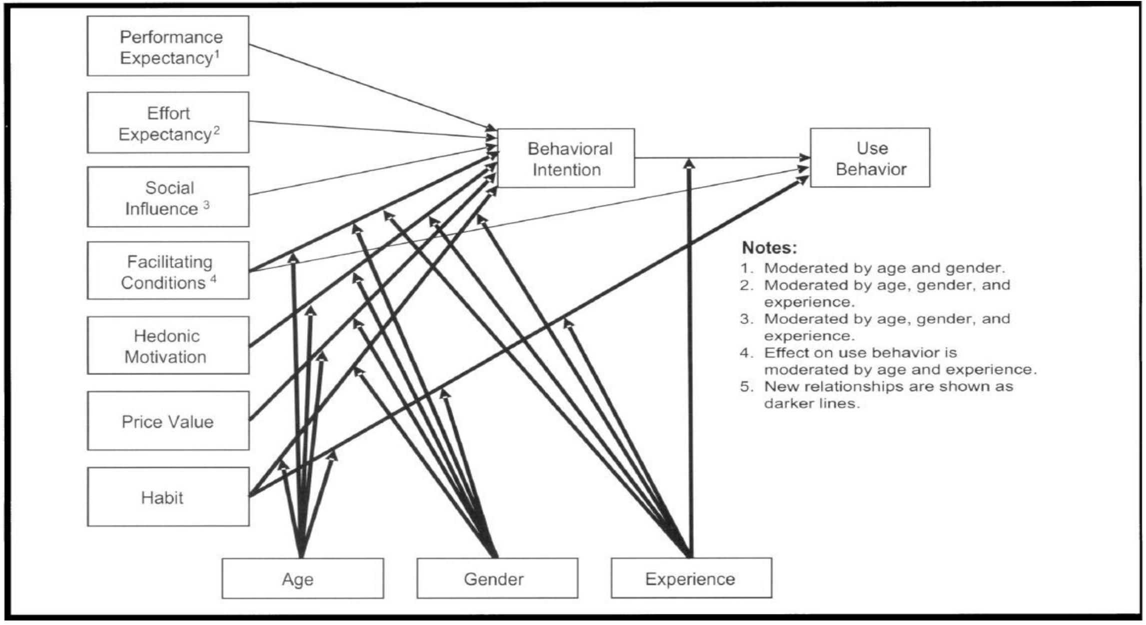

Figure 3. Research Model of UTAUT2 [29]

1.6. Related Previous Research

Recent studies show the importance of comprehending people's behavior when embracing new digital technology. These studies reinforce the extended technology acceptance model (TAM2) and technology organization environment (TOE) frameworks within construction projects and e-commerce [2], [25]. It led to a complex relationship between system features and responsible system usage.

Other studies have shown the UTAUT2 and TTF models' effectiveness in analyzing user intentions towards augmented reality implementation in learning and e-commerce study cases [26], [27]. However, no one uses it to comprehend the factors influencing users' behavior in asset management systems. There are also some studies that comprehend the users’ behavior with various technology in asset management sector, such as implementation of building information modeling for facilities management and metaverse for construction [36], [37]. These two studies also prefer UTAUT model in analyzation. One of the most nearly related studies is analyzing home automation using UTAUT [24]. But this study was not combined other model for further analysis.

2. Research Method

2.1. Respondents and Data Collection

This study's primary goal is determining the factors that compel users' intention to adopt emerging technologies, especially the Internet of Things. We are introducing the concept of IoT implementation in state-owned assets. We are doing this to make them understand how these technologies can improve their work with automation and real-time data.

To collect relevant and reliable data, this survey uses cluster sampling that targets State Asset Management Information System (SIMAN) operators in the Ministry of Finance working units [38]. With a population of 903 employees, Slovin's formula calculated that this survey needed at least 277 respondents and this study has achieved 350 respondents. Slovin’s formula is a way to determine the minimum sample size needed for a certain level of confidence to have more accurate results of quantitative research [39]. Table 1 shows the demographic characteristics of the respondents.

Table 1. Respondent’s Demographic Profile

Profiles	Classification	Number	Percentage (%)
Gender	Male	280	80.00
	Female	70	20.00
Age	Gen Z (22-26)	193	55.14
	Millennial (27-42)	142	40.57
	Gen X (43-53)	15	4.29
IT Skills	Expert	8	2.29
	High	162	46.29
	Medium	166	47.43
	Low	13	3.71
	Incapable	1	0.29
Voluntary of Use	Strongly Agree	260	74.29
	Agree	80	22.86
	Neutral	10	2.86

Finally, this survey is analyzed using the Partial Least Square Structural Equation Model (PLS-SEM) with SmartPLS 4, and the moderating factors are analyzed using Multi-Group Analysis [40].

2.2. Questionnaire Development

An online survey questionnaire was used in this investigation to collect pertinent data. To ensure the translation accurately and clearly expressed the original message, the questionnaire was translated from English into Indonesian and then double-checked by the writer. This study used the widely used Likert scale. Each statement is translated into five elements, where 1 represents "strongly disagree" and 5 represents "strongly agree".

The survey questionnaire has three sections. The first component tries to compile participant demographic data, such as gender, age, information technology skills, and work experience. In the second section, an introduction to the Internet of Things concept and implementation examples are explained to raise asset management systems' value, reliability, and effectiveness. The research model's key constructs are the subject of various inquiries in the third section. Ten constructs make up the research model for this study, seven of which are related to the UTAUT2 model, including task-technology fit, technology characteristics, task characteristics, performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and behavioral intention. Voluntary use as moderator is also included in the third section. The detail of the questionnaire is shown in Table 2.

2.3. Research Methodology

As shown in Figure 4, this research methodology integrating the Unified Theory of Acceptance and Use of Technology (UTAUT2) model to understand the fundamental drivers of users' intention with the Task-Technology Fit (TTF) model to explore further how technology leads to performance impacts with the additional insights of moderating factors including age, gender, information technology skills, and voluntary of use [29], [30]. This study used a quantitative method to gather numerical data for generalization across populations or to explain a particular event [27]. In this study, the conceptual model had specified relationships between the variables. Therefore, the quantitative research design that best fits the objectives of this investigation was a descriptive correlational research approach. Furthermore, this study created a proper survey to gather empirical data reliable in study.

Table 2. Survey Questionnaire

Construct	Code	Question
Task Characteristics (TaC)	TaC1	SIMAN should be able to provide state-owned assets information automatically.
	TaC2	SIMAN should be able to provide state-owned assets information accurately.
	TaC3	SIMAN should be able to provide real-time state-owned assets information.
Technology Characteristics (TeC)	TeC1	Internet of Things can provide automated services.
	TeC2	Internet of Things can provide accurate services.
	TeC3	Internet of Things can provide services in real-time.
Task-Technology Fit (TTF)	TTF1	Adopting Internet of Things in SIMAN can provide state-owned assets information automatically.
	TTF2	Adopting Internet of Things in SIMAN can provide state-owned assets information accurately.
	TTF3	Adopting Internet of Things in SIMAN can provide real-time state-owned assets information.
Performance Expectancy (PE)	PE1	Implementing Internet of Things in state-owned assets will be useful and improve asset management performance.
	PE2	The application of Internet of Things to state-owned assets allows asset management information to be obtained automatically, accurately and in real-time.
	PE3	Implementing Internet of Things in state-owned assets will help my asset management work become more efficient and productive.
Effort Expectancy (EE)	EE1	Implementing Internet of Things at state-owned assets is easy for me to learn.
	EE2	The use of Internet of Things in state-owned assets are easy for me to understand.
	EE3	I can share knowledge with other colleagues regarding the implementation of Internet of Things at state-owned assets.
Social Influence (SI)	SI1	If colleagues around me have started using Internet of Things at state-owned assets, then I will also use it.
	SI2	If the leadership in my office asks to use Internet of Things at state-owned assets, then I will use it.
	SI3	If most office employees use Internet of Things on state-owned assets, then I will use it too.
Facilitating Conditions (FC)	FC1	If Internet of Things is applied to state-owned assets, I have the knowledge needed to use it.
	FC2	If Internet of Things is applied to state-owned assets, the organization or work unit has the technology needed to use it.
	FC3	If Internet of Things is applied to state-owned assets, the Ministry of Finance and the Directorate General of State Asset Management will have the service support needed for its use.
Hedonic Motivation (HM)	HM1	I would be happy if Internet of Things could be applied to state-owned assets to improve asset management performance.
	HM2	I will enjoy using Internet of Things applied to state-owned assets so that it can help asset management work.
	HM3	I will be comfortable if the implementation of Internet of Things at state-owned assets can automate asset management work and provide information accurately and in real-time.
Price Value (PV)	PV1	In the near-term implementing Internet of Things at state-owned assets is a reasonable price compared to the value obtained.
	PV2	In the near-term implementing Internet of Things in state-owned assets will be a more profitable investment with the resulting performance efficiency.
	PV3	The implementation of Internet of Things in state-owned assets will reach a reasonable price soon.
Behavioral Intention (BI)	BI1	If Internet of Things is applied to state-owned assets, I will get used to using it voluntarily.
	BI2	If Internet of Things is applied to state-owned assets, I intend to use it to make asset management work easier.
	BI3	If Internet of Things is applied to state-owned assets, I will use it more often in asset management work.

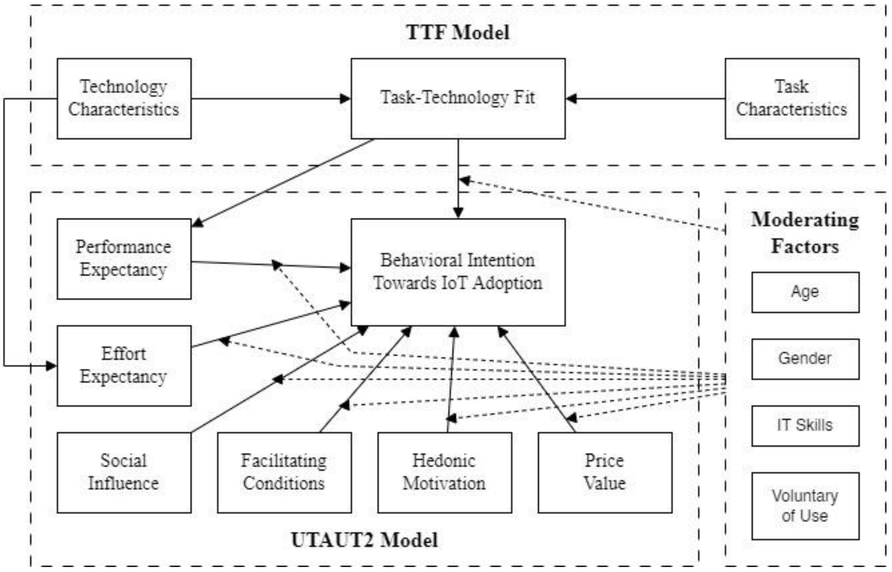

Figure 4. Research Model of TTF and UTAUT2

3. Results and Discussions

3.1. Measurement Model Assessment

Assessing whether the data statistically supports the study's hypotheses requires evaluating the measurement model [26], [27]. The measurement model assessment approach comprises two steps for validation criteria: construct validity and construct reliability. Measures of construct reliability include Cronbach's alpha and composite re-liability. An alpha coefficient of more than 0.70 is assessed as a statistically desirable outcome in pertinent investigations that rely on empirical analysis [23], [25], [26], [27], [41]. The calculated values shown in Table 3.

Table 3. Cronbach’s Alpha Coefficient, Composite Reliability, and Average Variance Extracted

Construct	CA	CR	AVE
TaC	0.903	0.939	0.838
TeC	0.944	0.964	0.900
TTF	0.935	0.958	0.884
PE	0.822	0.894	0.738
EE	0.897	0.936	0.831
SI	0.916	0.947	0.856
FC	0.876	0.923	0.799
HM	0.946	0.965	0.902
PV	0.922	0.950	0.865
BI	0.930	0.955	0.877

Where CA is Cronbach’s Alpha, CR is Composite Reliability and AVE is Average Variance Extracted. Convergent and discriminant validity empirical data are used to evaluate the construct validity. The convergent validity is evaluated by calculating the loading fac-tor of measurement items and the average variance explained (AVE) for each construct in the suggested model. All assessment items have loading factors of more than 0.7, and all constructs have AVE values greater than 0.5, which are accepted. As predicted theoretically, which assesses discriminant validity at the item level, demonstrates that every item loads more heavily on its corresponding construct than other constructs. The discriminant validity is established at the construct level if the square root of AVE (bolded) for every construct is higher than the correlation of that construct with other constructs in the model. Fornell and Larcker’s criteria have been empirically supported, as shown in Table 4, indicating that the discriminant validity is supported. Additionally, from the heterotrait-monotrait ratio with a suggesting value less than 0.90, we can accept (although TTF to TeC value is 0.915, but still lower than TeC's AVE square root 0.949). In conclusion, all measurement models meet the validation criteria regarding reliability and validity.

Table 4. Heterotrait-Monotrait (HTMT) Ratio and Fornell and Larcker’s Criteria

	TaC	TeC	TTF	PE	EE	SI	FC	HM	PV	BI
TaC	**0.915**									
TeC	0.554	**0.949**								
TTF	0.566	0.915	**0.940**							
PE	0.568	0.782	0.770	**0.859**						
EE	0.344	0.606	0.593	0.663	**0.912**					
SI	0.427	0.557	0.542	0.546	0.555	**0.925**				
FC	0.303	0.563	0.519	0.535	0.633	0.491	**0.894**			
HM	0.544	0.628	0.609	0.715	0.571	0.541	0.457	**0.950**		
PV	0.413	0.587	0.575	0.600	0.584	0.476	0.644	0.507	**0.930**	
BI	0.561	0.651	0.654	0.677	0.598	0.593	0.483	0.731	0.600	**0.936**

3.2. Structural Model Assessment

To prove that the conceptual model has a satisfactory data-model fit, a few problems must be resolved before hypothesis testing is carried out. First and foremost, evaluating the model's multicollinearity component is critical. The variance inflation factors (VIFs) for each construct in this model are often computed to test for multicollinearity. When Kock and Lynn determined the VIFs threshold, they thought that a value of more than five indicated the presence of a multicollinearity issue. All VIFs’ paths are below 5, so there is no multicollinearity.

The second method of evaluating the structural model's fit is looking at the total variance (R^2) for which the independent variables account. In this study, the research model demonstrates a 66.2% variation in task-technology fit, 31.1% in performance expectancy, 45.8% in effort expectancy, and 74.8% in behavioral intention as the strongest, as shown in Table 5. These findings suggest that the structural model is legitimate since it shows good structural model fit, validity, and performance.

Table 5. R-Square

Construct	R-Square	Explanation
TTF	0.662	Pretty Strong
PE	0.311	Pretty Weak
EE	0.458	Moderate
BI	0.748	Strong

The third method is examining the F^2, and Table 6 shows that in 11 paths of hypotheses, only three show a more significant impact: TeC → TTF, TeC → EE, and TTF → PE, other than that considered as weak or moderate impact. Lastly, the below results show that the model is eligible for hypothesis testing. The SmartPLS 4 was used to test the hypotheses put forward in this model. Four hypotheses do not meet the p-value criteria and other hypotheses are shown to be statistically significant, and some are even stronger.

Table 6. F-Square

Path	F-Square	Explanation
TaC → TTF	0.034	Moderate
TeC → TTF	1.892	High
TeC → EE	0.451	High
TTF → PE	0.845	High
TTF → BI	0.001	Weak
PE → BI	0.001	Weak
EE → BI	0.006	Weak
SI → BI	0.025	Moderate
FC → BI	0.001	Weak
HM → BI	0.145	Moderate
PV → BI	0.025	Moderate

3.3. Moderation Analysis

The current study examines the moderating effects of age, gender, information technology proficiency, and voluntary use using multi-group analysis (MGA). Unlike simple moderation studies, which presume the moderator influences a structural pathway, MGAs examine two or more factors across groups [40]. MGA contrasts group structural routes [42]. We split the sample based on age into younger (Generation Z) and older. We also divided the sample, based on gender, into males and females. Then, we divided the sample based on IT abilities into higher and lower categories. Finally, we divided the sample based on voluntary use into strongly agree and agree categories.

According to the results, as shown in Table 7-10 below, all moderating factors almost moderate the effect of all constructs on users' intention towards IoT adoption in SIMAN. However, females were more affected by social influence and price value constructs, while males were more affected by hedonic motivation construct. Additionally, elders were also more affected by the hedonic motivation construct.

Table 7. Moderation Analysis (Gender)

Path	Male (β)	Female (β)	Difference (Δβ)
TTF → BI	0.152*	-	-
PE → BI	0.036	0.132	-0.096
EE → BI	0.075	0.135	-0.060
SI → BI	0.169	0.170	-0.001**
FC → BI	-0.039	-0.037	0.002
HM → BI	0.392	0.209	0.183***
PV → BI	0.180	0.227	-0.047***

Notes: *$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$

Table 8. Moderation Analysis (Age)

Path	Younger (β)	Older (β)	Difference (Δβ)
TTF → BI	0.171	0.124	0.047
PE → BI	0.115	-0.044	0.160
EE → BI	0.056	0.109	-0.053
SI → BI	0.210	0.097	0.113
FC → BI	0.038	-0.076	0.113
HM → BI	0.249	0.564	-0.315*
PV → BI	0.154	0.165	-0.012

Notes: *$p \leq 0.05$

Table 9. Moderation Analysis (IT Skills)

Path	Higher (β)	Lower (β)	Difference (Δβ)
TTF → BI	0.216	0.111	0.105
PE → BI	0.121	0.007	0.113
EE → BI	0.027	0.135	-0.108
SI → BI	0.128	0.153	-0.025
FC → BI	-0.043	-0.018	-0.025
HM → BI	0.347	0.386	-0.039
PV → BI	0.135	0.203	-0.068

Table 10. Moderation Analysis (Voluntary of Use)

Path	Very Interested (β)	Interested (β)	Difference (Δβ)
TTF → BI	0.035	0.171	-0.013
PE → BI	0.063	-0.036	-0.013
EE → BI	0.075	0.043	-0.136
SI → BI	0.173	0.187	-0.301
FC → BI	0.006	-0.088	0.068
HM → BI	0.323	0.401	-0.240
PV → BI	0.180	0.193	-0.080

3.4. Discussions

The combination of UTAUT2 and TTF models can be used to analyze the correlation between IoT technology and task adoption in asset management with users' intention of adopting it in their work. This research helps us examine the factors that com-pel users adopt emerging technologies to improve their performance.

Current studies have proven that task and technology characteristics affect task-technology fit, which applies to this study [21], [22], [23], [24]. Moreover, this study confirms that technology characteristics affect effort expectancy and task-technology fit impact performance expectancy. However, this study only proves that three out of seven hypotheses are confirmed to affect behavioral intention: social influence, hedonic motivation, and price value. All hypotheses' results can be seen in Table 11.

Table 11. Hypotheses Testing Results

Path	VIFs	PC	TS	Supported
TaC → TTF	1.356	0.108**	2.622	✓
TeC → TTF	1.356	0.804***	20.552	✓
TeC → EE	1.000	0.558***	12.411	✓
TTF → PE	1.000	0.677***	16.420	✓
TTF → BI	3.368	0.041	0.522	✗
PE → BI	4.750	0.043	0.421	✗
EE → BI	3.103	0.077	1.150	✗
SI → BI	2.115	0.134*	1.963	✓
FC → BI	2.464	-0.031	0.543	✗
HM → BI	2.546	0.353***	4.740	✓
PV → BI	2.505	0.145*	2.164	✓

Notes: *$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$

Where VIFs is Variance Inflation Factors and PC is Path Coefficient, TS is T Statistic ([O/STDEV]). All moderating factors almost moderate the effect of all constructs. However, gender moderate intriguing results. Females were more compelled to adopt IoT by their social impact and worth the price, while males were more intent on adopting IoT by their happiness to adopt emerging technologies. Additionally, elders would be happier if IoT adoption could make their work easier.

4. Conclusions

From this research, we can conclude several factors that compel users' intention on adopting Internet of Things in asset management. Several factors compel users' intention to adopt the Internet of Things in asset management: social influence, hedonic motivation, and price value. We can conclude that SIMAN operators would love to experience the adoption of IoT in asset management if the organization endorses the implementation. Factors that are not supported can be biased since SIMAN operators do not have an actual project implementation of the IoT because it has not been implemented. An-other conclusion can be derived that if SIMAN implements IoT, the users are willing to use it since the organization told them to. It does not matter if it makes their work easier or enhances their performance. This research is conducted before the adoption is implemented, so the users can be biased with only their imagination or description stated. Another limitation is that this study's research model only combines TTF and UTAUT2 models. Future studies should be conducted to develop the conceptual framework of IoT adoption in SIMAN or state-owned assets since this study has proven that users are willing to implement it.

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